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A close-up photograph of a duck and its ducklings in a pond. The duck, with dark, mottled feathers and a prominent orange beak, is facing right. In the foreground, two ducklings with yellow and brown down feathers are visible, one facing left and one facing right. The water is greenish and shows ripples. The background is a lush green of aquatic plants.

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Training 1.1 Eastern Black Rhinos (*Diceros bicornis michaeli*) for Voluntary Head Radiographs

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INTRODUCTION

The Blank Park Zoo, located in Des Moines, Iowa, is home to 1.1 eastern black rhinoceros (*Diceros bicornis michaeli*). Acquired in 2012, Ayana the female and Kiano the male, both three-years-old, are part of the zoo's newest African expansion, 'Jamaa Kwa', which opened in the spring of 2013. Since their arrival, the pair has been participating in a daily training program. The goal of the training program is to improve management and welfare through voluntary participation in all aspects of daily husbandry and medical procedures. To date, both rhinos participate in voluntary blood draws, body desensitization, walking through/standing in a restraint device, and several other body positioning behaviors. Their most recently trained behavior was to allow head radiographs to be taken.

Our veterinary staff encouraged training for head radiographs on these individuals for a couple of reasons. First, as a calf, the male received an injury to his soft palate and veterinarians suspected this could be contributing to his labored breathing on hot days ($\geq 30^{\circ}\text{C}$) and during strenuous exercise. Secondly, the female displayed excessive horn rubbing, which has the tendency to cause significant wear to her anterior horn, leading to cracks and raw spots. By training the rhinos to accept the head radiographing, it provided the veterinary staff with additional diagnostic tools to determine if there are any medical issues affecting their sinus cavities.

The purpose of this Training Tale is to outline the steps of how the Blank Park Zoo's rhino staff trained Kiano and Ayana to participate in a successful head radiograph procedure.

TRAINING STEPS

The desired behavioral response was for each rhino to safely position its head through restraint bars and hold steady long enough to capture a clear radiograph image. Before training could begin, a safe place for the procedure was located, shaping plans were written, as well as a plan to desensitize the rhinos to novel equipment.

The training took place in the restraint device (Fauna Research Inc. Hippo/Rhino TAMER) located in the zoo's rhino barn. This area proved ideal because of the rhinos' familiarity with it, personnel and rhino safety, as well as the ability to modify the area to suit our training needs. The bars located at both ends of the restraint device could be moved from a vertical position to a "V" position, creating just enough space to allow the rhinos' heads through, but not their entire bodies (Figure 1). Since Kiano's head is not as wide as Ayana's, two-inch washers were taped together and mounted on the pin supporting the moved restraint bar to create the necessary smaller space.

Loading onto and standing steady on the device were previously learned behaviors. The goal behaviors to train for the radiograph procedure were as follows:

- To position the head out through the restraint bars
- To hold head steady in the proper position
- To desensitize rhinos to novel equipment and people

Figure 1 (opposite page): Training head hold; desensitizing to all props and large numbers of people present.

Figure 2 (right): 1.0 Kiano's radiographing procedure.

Photos courtesy of Blank Park Zoo

Once the rhino stepped up into the restraint device, training for proper head positioning through the modified restraint bars began. The trainer gave the previously learned 'come' command (rhino targets to the trainer's fist), gradually increasing the distance their head was extended outside the bars. When reliably presenting their head outside the bars, trainers progressed by asking for head holds (Figure 1).

The most important behavior to be established was the head hold, necessary for obtaining a clear radiograph image. Initially, head holds for both rhinos were trained and established in areas other than the restraint device. Because of their training ability, different methods were utilized for each rhino. The following method was successfully used to train Ayana, who is more compliant and focused than Kiano. To train 'hold,' the trainer brought the target pole to the rhino's upper lip (an inch or two below the anterior horn), commanded 'hold,' bridged after one second of holding the head steady and then slowly increased hold duration as training progressed.

Kiano, who is more excitable than Ayana, had a difficult time holding his head steady using this method, so a different, less conventional method was used. We had noticed that Kiano would keep his head still while he was chewing on produce, which could allow the trainer to capture the 'hold' behavior rather than shape it. After Kiano successfully performed a simple behavior (such as 'target' or 'head up') he was given a few extra pieces of produce, providing the trainer ample time to capture a 'hold.' This method worked well with Kiano, and the movement of the jaw would not affect the radiograph image of the sinuses. The final steps were to establish the head hold with their heads positioned through the restraint bars. To ensure no accidental radiation exposure occurred to the trainer, the rhinos were then conditioned to the trainer backing up a few feet after asking for a 'hold'.

To accurately mimic a head radiograph procedure, a number of props were required: cutting board supported on concrete blocks, cardboard radiograph machine with flashlight, hay cart, lead aprons, and a few extra people. We started with the cutting board on the concrete blocks, which mimicked the radiograph plate (Figures 1 and 2). The goal was for the rhinos to ignore the plate while being comfortable with it positioned right next





Figure 3: 1.0 Kiano's head radiograph
Photo courtesy of Blank Park Zoo

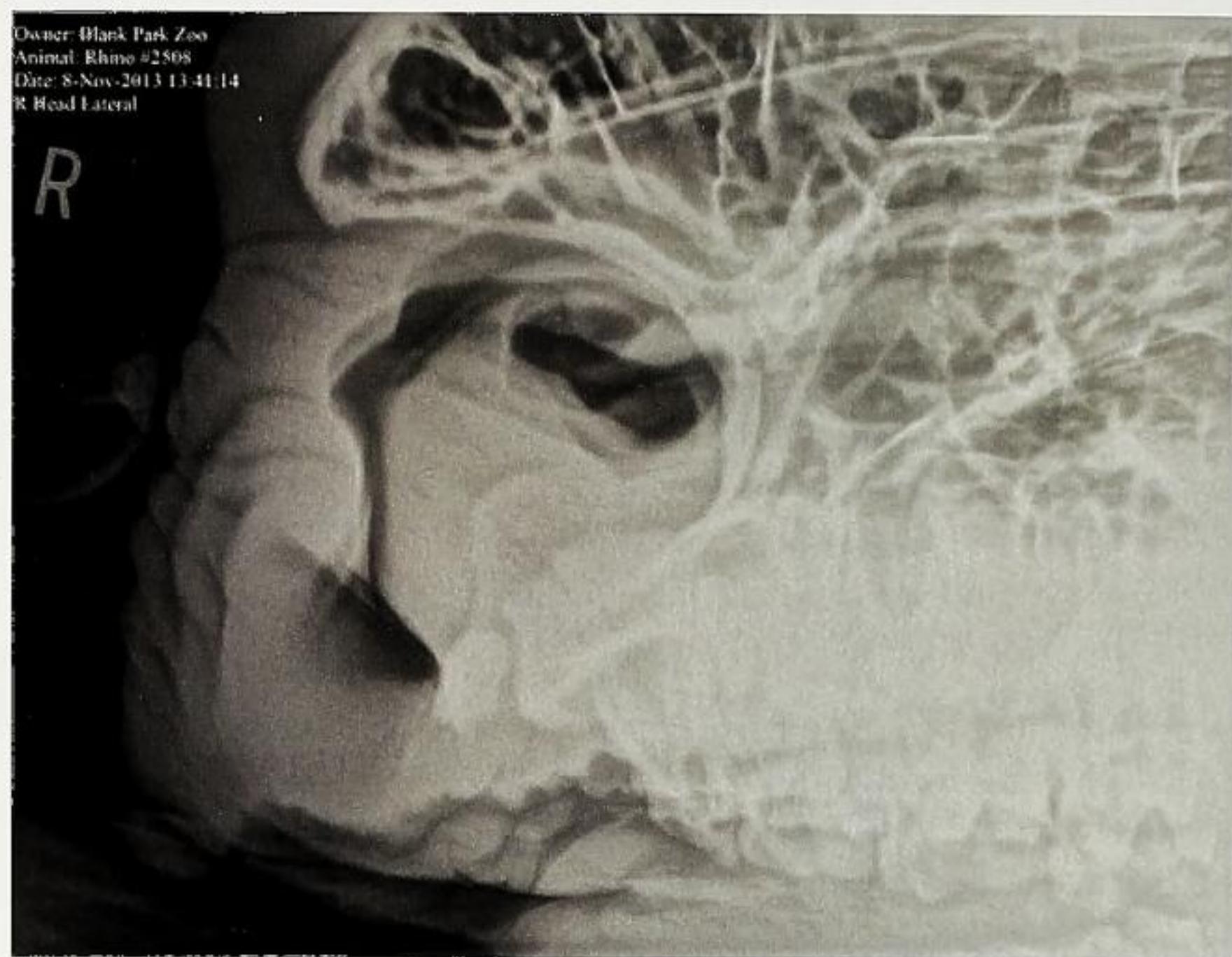


Figure 4: 0.1 Ayana's head radiograph
Photo courtesy of Blank Park Zoo

to their heads. Kiano ignored the cutting board and blocks from the beginning, but Ayana's head would constantly drift towards the objects, likely seeing them as potential enrichment. We fixed this by rewarding her for ignoring the cutting board and focusing on the trainer. We also asked for simple behaviors ('target,' 'head up,' 'open mouth') on the opposite side of the cutting board, which seemed to help as well. We continued desensitizing by adding in the hay cart, which represented the laptop cart, a laptop, the cardboard radiograph machine with flashlight, and lead aprons. Each session lasted 3-5 minutes per rhino and always ended positively.

To gauge the rhinos' progress, we decided to incorporate all props and rhino staff to mimic a complete procedure. Kiano did well with all aspects, while Ayana was nervous throughout the session. We suspected the reason for her nervousness may be due to the lead aprons and additional keepers standing behind the trainer. The aprons were removed and the keepers repositioned, which calmed Ayana enough to reposition her head through the bars, and perform a few good head holds. After that day, keepers wore the lead apron during shifting and interactions, helping create a positive attitude toward the novel item. Though initially timid, Ayana eventually grew comfortable with the lead aprons.

In the late stages of training head radiographs, we invited large student groups (~10 people) to watch and take part in training sessions to mimic the large group that would be present for the procedure (Figure 1). The vet staff also participated in another session, which helped trainers understand how the actual procedure would transpire, and allowed us the opportunity to reposition equipment as needed.

On the day of the procedure, everything went smoothly. The rhinos stayed focused on the trainers and performed the head holds as trained despite the presence of an unforeseen piece of equipment, a chair to support the radiograph machine (Figure 2). The dedication to the training program by rhino keeper staff and the voluntary participation from the rhinos helped reduce any stress or errors, and made for solid, clear radiograph images (Figures 3 and 4).

CONCLUSION

Overall, the procedure was successful and helped veterinary staff identify issues with Ayana and Kiano's sinuses. The deep horn grooves caused by Ayana's excessive horn rubbing were getting within inches of the sinus cavities. With this finding, changes to rhino housing and husbandry practices were made. Ayana focused her rubbing on the lips of the concrete drinkers. PVC or epoxy was added to the lip to create a less-abrasive surface (Figure 5). Additionally, the water levels were lowered in the drinkers to discourage head dunking. Head dunking appeared to stimulate the horn rubbing. And since head dunking in the water stimulated horn rubbing, we lowered drinker water levels enough to greatly reduce the head dunking behavior. These changes have almost eliminated the excessive horn rubbing! As far as Kiano is concerned, there did not seem to be any significant or long-term damage resulting from his earlier injury. No changes to housing or husbandry were made, but we still monitor his breathing rates during particularly warm days.

We feel Blank Park Zoo's rhino training program has opened various opportunities for more complex behaviors that may be essential in the future. Through teamwork, cooperative rhinos, time and patience we can greatly improve the rhinos' welfare, one behavior at a time.